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A Qualitative Study of NIMBYism for Waste in Smaller Urban Areas of a Low-Income Country, Mzuzu, Malawi

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ABSTRACT: When waste management infrastructure is built, there can be resistance from the local affected populations, often termed the Not in My Backyard (NIMBY) phenomenon. This study aims to understand the forms of resistance that may develop in such contexts, focusing on 2 solid waste and 1 liquid waste management site within Mzuzu City, Malawi. At the newest solid waste site, community resistance had grown to the extent that the site was reportedly destroyed by the local community. Interviews and observations of the sites are complemented by examining historic and recent satellite images. It was found that, at the new solid waste site, community engagement had not been conducted effectively prior to construction and as part of ongoing site operations. This was compounded by poor site management and the non-delivery of the promised benefits to the community. In contrast, at the liquid waste site, the community could access untreated sludge for use as fertilizer and were happier to live within its vicinity. While NIMBYism is a frustrating phenomenon for city planners, it is understandable that communities want to protect their health and well-being when there is a history of mismanagement of waste sites which is sadly common in low-income settings. It is difficult for government agencies to deliver these services and broader waste management. In this study, an unsuccessful attempt to do something better with a legitimate goal is not necessarily a failure, but part of a natural learning process for getting things right.

KEYWORDS: Malawi, not in my backyard, NIMBY, stakeholder engagement, solid waste, sub-Saharan Africa

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Introduction

Across the global south, the rapid growth of cities necessitates the expansion of infrastructure to process the increased waste streams. Between 2015 and 2040, it is estimated that the waste volumes in urban Africa will increase from approximately 124 to 368 million metric tons per year, which is an increase of over 200%.[1] To promote the development of healthy and livable cities, urban planning authorities must develop infrastructure to enable the safe collection, processing, and disposal of these growing liquid and solid waste streams. However, studies regarding the human dimensions of residents living within the vicinity of waste facilities in Africa highlight how the location, design, and operation of such facilities can be controversial.[2-5]

These concerns mirror a broader global literature on local opposition to waste infrastructure sites. In particular, the phenomena of local citizens raising concerns, and often their use of the legal system, to object to the building or running of infrastructure is referred to colloquially as "not in my back yard" (NIMBY) resistance. Many studies have been conducted on NIMBYism for environmental controversies, particularly in the global north.[6-9] However, the dynamics differ in the global south, where formal planning institutions tend to be weaker and the importance of customary institutions is stronger.[2] Communities relying on strong informal institutions, such as tribal or clan-based land governance systems, can be disempowered by parallel processes in formal, legal, systems shifting land ownership without their knowledge or consent.[5]

There remains a need to develop a better understanding of forms of NIMBY resistance, and how and why communities may resist waste infrastructures. Therefore, this study aimed to compare the community attitudes toward 2 solid waste and 1 liquid waste sites within the same city in the global south. By comparing these 3 sites that share the same site operator and cultural influences, we can understand the attributes of waste-processing facilities with the most negative impacts as seen by the local communities. This includes the design and operation of the sites, the community engagement, and how the community receives benefits at different stages of the process. Lessons will be documented to provide smaller urban areas in low-income countries with strategic guidance on how to revise infrastructure planning and engagement processes—both at policy and practitioner level—to maximize the well-being of local residents and achieve safe waste management.

Methods

Study site

Mzuzu City, located in northern Malawi, has experienced a high population growth rate linked to rural to urban migration. Between 2008 and 2018, the population of Mzuzu increased

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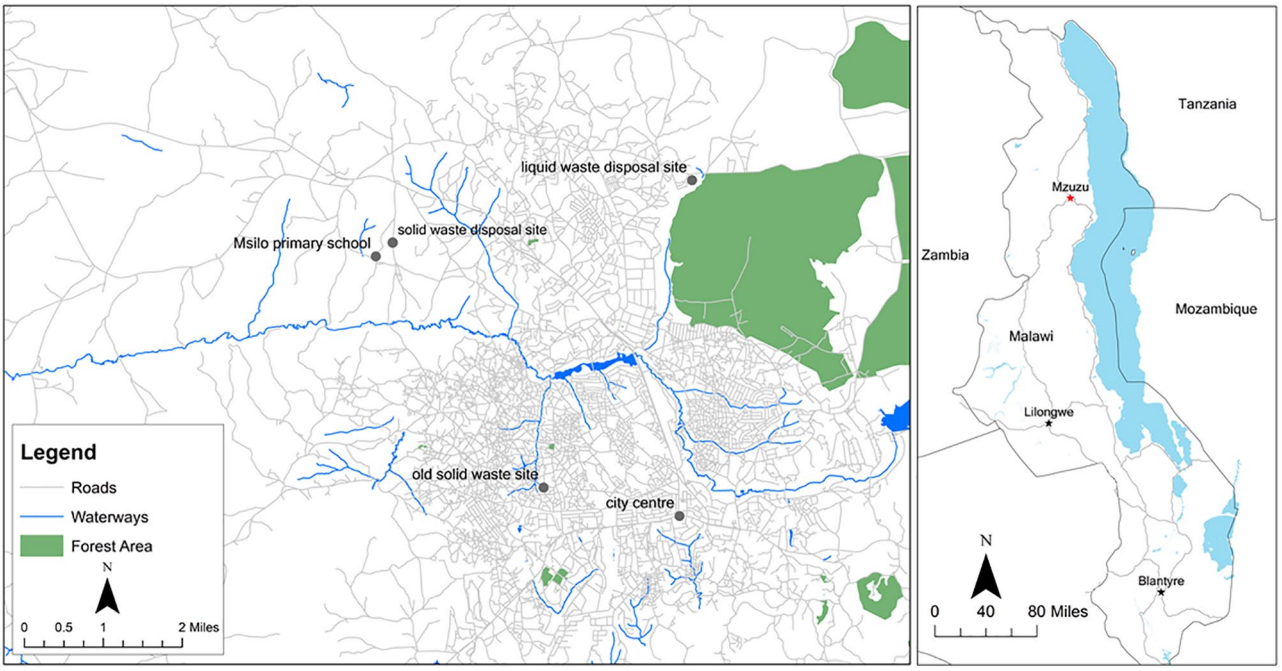


Figure 1. Study site, Mzuzu, Malawi.

from 128 000 to 221 000, which is the highest growth rate of any Malawian city.[10] Population growth has brought several challenges, including the delivery of water, sanitation, and hygiene services. Solid and liquid waste services in Malawi are guided by the National Sanitation Policy.[11] The Mzuzu City Council (MCC) provides solid waste service collection to commercial, health institutions, and some industrial areas. Most household waste is disposed onsite, either in shallow dug pits or by burning, as local governments do not provide household street collection services and there are limited private sector services for households. In 2013, the MCC estimated that only 7% of the estimated 22 000 metric tons of solid waste generated in the city per year was collected (approximately half a kilogram per day per person).[12,13] Additionally, the city has no sewer system, and fecal sludge is managed with pit latrines and septic tanks, which eventually fill and must be emptied at a central facility.

Our study sites, the Msilo waste management facility, the Nkhorongo liquid waste and fecal sludge ponds, and the Mchengautuwa dump site (Figures 1 and 2), are owned and operated by the MCC (see Table 1).

Sample recruitment and data collection

Respondents linked to the Msilo facility were purposively sampled to reflect a range of stakeholders. The sample was not intended to be statistically representative. A key informant from the MCC was interviewed both before and after the closure of the site. Community members were also interviewed after the closure of the site, and the existing study subjects recruited additional interviewees surrounding the facility until different interest groups had been identified and interviewed. The interview participants were asked about their knowledge and involvement in the Msilo facility, including site selection and land acquisition, construction, operation, community benefits, and agreements with the MCC. The Msilo facility construction engineer was further asked about the major participants who influenced the engineering design, costs, and challenges during construction. Interviews were conducted by 2 of the authors between January and May 2020 (RHH and BAC) in the preferred language of the interviewee, i.e., Chitumbuka, Chichewa, or English.

Interviews regarding the Nkhorongo facility conducted in 2017[14] were revaluated for this study. Farmers residing in the area surrounding the facility were interviewed and then identified by snowball sampling until the process repeatedly returned to the same participants. Farmers were asked about the site, how they interacted with the MCC and staff at the facility, and about their use of fecal sludge from the site.

To estimate the Msilo facility usage patterns, MCC solid waste vehicle mileage logbooks from November 2017 to August 2019 were evaluated (personal communication, MCC on January 28, 2020). Data regarding private disposal usage patterns were unavailable, but in practice would have been limited. To determine the usage patterns of the Nkhorongo facility, a truck counting survey was conducted for 5 consecutive business days in February 2020. A researcher observed trucks near the entrance, including their arrival and departure times, owner, type, and number of workers. Field observations were conducted from 30 minutes before to 30 minutes after the official facility opening hours.

To assess the potential impact of population growth, satellite imagery was collected from the last 2 census periods. The best satellite imagery close to the 2008 census was only available



Figure 2. (a) Msilo waste management facility, January 2019, (b) Nkhorongo liquid waste and fecal sludge ponds, January 2020, (c) Msilo waste management facility after perimeter fence destruction, January 2020, and (d) the (closed) Mchengautuwa dump site, January 2019.

for late-2006, which was compared with the satellite imagery for the census period of 2018. The number of buildings within a 1-km radius of the Msilo and Nkhorongo facilities was taken as a proxy of the population density by counting buildings contained within Google Earth imagery in 2006 and 2018.

Local media articles published before the construction of the Msilo facility and after the site's closure were reviewed with regard to the NIMBYism themes.

Data were also captured via archived photographs (RHH).

Data management and analysis

Interview data were recorded using a notebook and/or audio recorder and transcribed. The data analysis process was iterative, and the data were qualitatively analyzed using thematic analysis. The method first involved data familiarization by reading and re-reading the transcribed data, followed by coding sentences from the interview transcripts relevant to the research topic. The initial evaluation by two of the authors (RHH and BAC) was subsequently checked by the other authors.

Ethical approval

This study, and its informed consent procedures, was approved by the Republic of Malawi National Commission for Science and Technology (P.09/19/415). Written informed consent was obtained from all in-depth interview participants.

Results

Construction of the new solid waste site

In the 1980s, the MCC began to use a dump site in the neighborhood of Mchengautuwa, originally filling an abandoned gravel pit previously used by a road construction company (Figure 3). There was no fence and, over time, the site was heavily encroached by both homes and agricultural activities, thereby exposing the local community to the waste site.[12,15] Furthermore, no attempt to sort the waste had been made.

Community protests against the Mchengautuwa dump site motivated the MCC to search for a new site and long-lasting solution for managing solid waste in the city. A new project was initiated, with phase 1 of the construction of the Msiro waste management facility costing approximately USD 300 000. Three quarters of the funds were provided by the European Union, and the remaining quarter by a non-governmental organization. The land at Msilo was identified by the MCC in 2013 from among 5 sites considered, and tests suggested that it had a suitable soil type. A consultant was hired to conduct an Environmental Impact Assessment (EIA) per the Environmental Management Act[16] and, although a draft was produced, we observed the EIA had not been finalized.

The MCC reported that they had consulted stakeholders in the site selection, including community leadership, religious leaders, and teachers at the adjacent primary school. However, during our stakeholder interviews, when asked if they were aware of how the land was acquired by the MCC, the majority of the community member respondents expressed unfamiliarity or said others besides themselves were included in these discussions. Interviewees only recalled that the land originally belonged to 2 main families, and there was a land dispute between them, whereby 1 of these families sold the land on to a local business person who was believed to have purchased the land for an intended use as a cattle ranch but the buyer subsequently further sold it to the MCC. A community leader further reflected when land is acquired in the area that normally the buyer would introduce themselves to the community leader so that the community can welcome the buyer. However, the interview data indicate that neither the local business person nor the MCC had followed this traditional practice to include a community introduction in the land purchase. Following the acquisition of the land by the MCC, the construction of the purpose-built Msilo facility started.

During the construction stages, the respondents reported that the community was concerned that the site may contaminate their drinking water supplies, and that it shared a fence with a school. However, the community did not make any formal legal objection against the MCC. During construction, some community members became aware of the potential site benefits from communication with the MCC, including employment opportunities, fish ponds, compost, and bottles to resell. The study data indicate that the attitudes of the respondents toward the site improved during the construction stage as they were convinced that it was not simply a "dump site."

Owing to their limited financial resources, only the first phase of the project was constructed by MCC, which included a leachate collection system, waste cleaning and drying platform, 1 landfill (of a planned three), and 1 sorting shed (of a planned three). Through its locally generated resources, the MCC also constructed a warehouse at the facility and added a central solid waste transfer station consisting of large metal open-topped collection containers at the main open-air market in the city. Other planned phases included the initiation of waste separation at the source, such as recycling containers, construction of further waste transfer stations, pumping and treating leachate from the landfill, and the use of large equipment to bury waste. The project was originally communicated to the public as the "first of its kind in Malawi" for reuse, recycling, and waste value chains, including the projected export of waste to South Africa (*Nyasa Times*, June 23, 2013). This was also observed at a broad level by a community respondent, who said:

> "We were not sure of what the facility will be used for much as there were rumors about the MCC waste management. But we're not sure what exactly would be going on there. We thought they will be processing the wastes when it comes from different places of the city rather than just dumping the wastes as the case had been after construction." *(Male community respondent, May 14*, 2020*)*

The designed lifespan of the facility was 50 years. As the draft EIA noted, there was a risk of the public, particularly school children, trespassing into the facility, which was mitigated by the construction of a brick fence with razor wire and a lockable gate. The fenced area, 0.12 km^2, was bordered on one side by a school, and the other sides were primarily rural with a few households. During construction, additional benefits to community infrastructure included the graded dirt road to the area, and the extension of the water and electricity mainlines to the site. Area households could connect to those water and electricity lines, but they were required to cover their connection costs to the mainline.

On May 18, 2017, the Msilo facility was hastily commissioned, even though it was incomplete, after pressure from the residents of the Mchengautuwa area to leave the original dump site. The commissioning ceremony was presided over by the wife of the then-President of the Republic of Malawi through the auspices of the Beautify Malawi (BEAM) Trust, an organization that she had founded aiming to develop a cleaner and healthier Malawi. At the facility opening ceremony, resistance from residents around the site was noted in the MCC Chief Executive Officer's speech, who stated "initially there was massive resistance from residents staying around this site who feared for their lives, as they thought crude dumping would be practiced. Mutual discussions helped to clear their fears." Although the ceremony was reported to have been attended by national and local government representatives, few local community members attended, and no community leaders provided opening speech remarks. One community member was reported to have been present during the ceremony because they wanted to see the wife of the then-President. Another respondent from the site area claimed that they only fully learned about the project and its intended activities during the opening ceremony.

Operation of the solid waste site

After opening phase 1, the MCC reported 4 main limiting factors in daily operations: (1) lack of large machinery for waste hauling and site compacting; (2) the citywide waste collected was directly hauled to the facility with no sorting or recycling at source; (3) limited waste transfer stations, for example, in markets; and (4) lack of money for operation, including fuel for the waste trucks and utilities for the site's buildings. The MCC had envisioned that the facility would self-generate income from business ventures, such as recycled material sales, and did not envision requirements for long-term operating funds. However, the data of our study indicate that the business plan was not fully implemented. Manual sorting of solid waste, including sorting

Table 1. Summary of the methods.

DATA COLLECTION DESCRIPTION	PURPOSE	SAMPLE CHARACTERISTICS	SAMPLE SIZE
In-depth interviews: Interviews with Msilo facility stakeholders. Interviewers were informed by NIMBY and allowed to probe around the observed specific themes.	Understand the current views of the Msilo facility and reasons for NIMBY attitudes.	MCC, residents near the facility, area health worker, commercial rest house near the facility, construction site engineer, and solid waste private sector provider.	12 stakeholders
Counting study: Msilo facility vehicle logs of trips by the MCC from November 2017 to August 2019. Visual observation of Nkhorongo facility for five consecutive business days in February 2020.	Calculate the facility usage frequency.	Waste trucks	2 sites
Historical satellite map reviews.	Map changes in the land use density over time.	Area within 1 km of the Msilo and Nkhorongo facilities in 2006 and 2018.	2 sites
In-depth interviews from Mallory et al.[14]: Data were reevaluated associated with the Nkhorongo facility.	Understand the current views of the Nkhorongo facility and reasons for community acceptance.	The MCC and farmers residing adjacent to the Nkhorongo facility and practicing fecal sludge reuse.	11 farmers, 1 MCC stakeholder
Grey literature: Available data related to Msilo facility management.	Review of government documents, memorandum of understanding (MOU), speeches, and newspaper articles for NIMBY attitudes.	Publicly available literature about the Msilo facility and citywide solid waste services.	Government records (3), speeches (1), and newspaper articles (9)

and selling plastic bottles, compost for use by landscape businesses, and cardboard for making briquettes, was conducted by thirteen staff hired by the MCC, 8 of whom were from the surrounding community. These employees were often paid late due to inadequate finances at the city level. Thus, the engineered site was essentially operated as a dump site from the time of opening, rather than generating any income under a business model.

At the time of conducting this research, the MCC operated 3 waste hauling trucks (Figure a1), collecting from 132 locations within the city throughout the year. No regular services were provided to private households. The most common collection sites were public spaces (markets, bus depots, churches, and city stadium; 47%; 1 387/2 937), commercial businesses (supermarkets, hotels, restaurants, private shops, or offices; 26%; 751/2 937), and large communal open-topped metal waste containers in the residential neighborhoods of Mzuzu (14%; 411/2 937). Less frequent collections were made at government offices (5%; 138/2 937), banks (5%; 136/2 937), medical facilities (3%; 79/2 937), and schools (primary/secondary schools, university, or colleges; 1%; 35/2 937).

The MCC estimated that 1 100 metric tons of solid waste were disposed at the Msilo facility per month, although a weighing scale had not been installed. Given a population of 221 000[10] generating an average of 0.5 kg of waste per day,[12] with a total of 3 360 metric tons/month, only 33% of the waste generated citywide was disposed at the Msilo facility.

During the interviews, the members of the Msilo area's community highlighted a number of challenges after operation of the new solid waste site started, including odor, flies, dogs, the site's proximity to the school, and water quality risks. Complaints regarding odor did not seem to be related to the weather or time of day, and a study researcher (RHH) had historically observed the open incineration of solid waste within the site. One community leader reported that they used a mosquito net to cover themselves while eating to prevent flies from landing on their food, and another community member reported an incident where they had swallowed a fly. Community members also reported a growing number of dogs in and around the facility, a concern associated with the threat they posed to children when traveling to the bordering area school. The researchers also observed dogs at the closed facility on January 11, 2020. The community and MCC disputed regarding the site health risks, and the authors were unable to verify them. Some community members attributed a local death from typhoid to the site. One community respondent stated the following regarding health risks:

> *"They used to live the other side, and even if I can go with you into the house they used to live, no one lives in there. Everyone is afraid to live in there because of what happened. The family got sick, everyone in the house. . .. Health workers got a local chief and went with {them} together to the stream to test the water and found out that it's typhoid. They told us the water is contaminated." (Female community leader respondent, May 2,* 2020*)*

Table 2. Community and Mzuzu City Council memorandum of understanding for the Msilo waste management facility.

MOU COMMITMENT	OBSERVED PRACTICE
(1) Waste should not be burned; it should be buried every week.	There was no sorting at the source to reduce, reuse, or recycle waste citywide. Waste was commonly burned. The MCC lacked the machinery to bury waste, although it was available locally and rented infrequently at a high daily cost.
(2) Conduct spraying of chemicals every week inside the Msilo facility and school to prevent flies and odor.	This was done infrequently, but not weekly due to lack of funds to support the activity at the MCC.
(3) Provide the school with electricity and build additional houses for teachers.	The school was connected to mainline electricity. Households near the facility could connect to the electricity at their own cost and were required to pay for ongoing usage. MCC lacked funding for additional houses for school teachers.
(4) Construct a community health clinic.	Not done.

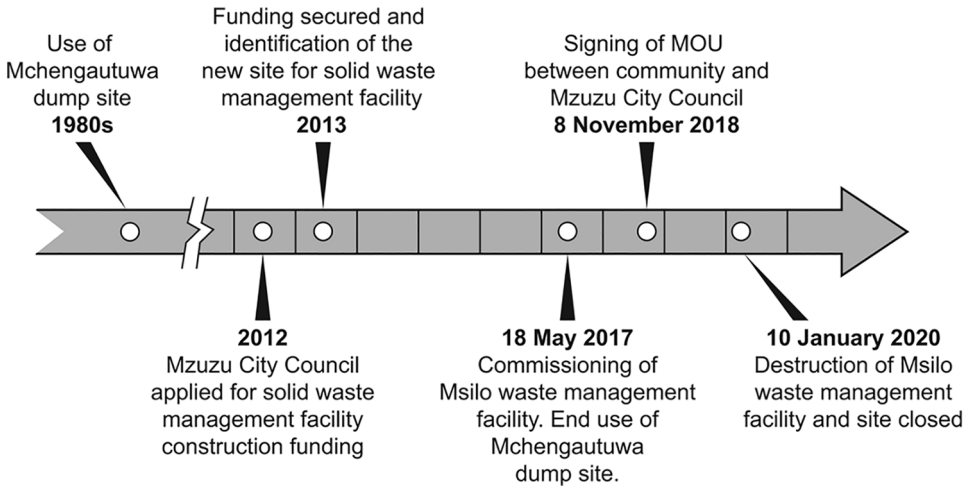


Figure 3. Solid waste activity timeline, Mzuzu, Malawi.

The data indicate that, soon after the facility operations commenced, the community intensified their complaints to the MCC. Community members reported that they had held several meetings, culminating in an MOU in November 2018 (Table 2), in which the MCC promised to abate the community's verbalized health risks through several activities. The data indicate that the MCC risk communication sessions with the community were driven by specific complaints, rather than a coordinated or planned risk communication approach. The newspaper articles and interviews with community respondents further triangulate that there was no consistent spokesperson from the community, and this lack of leadership may have led to breakdowns in negotiations regarding risks with the MCC.

The MOU was a handwritten document developed by the community, and not a legal arrangement. It does not describe how community members can access the benefits of the facilities, such as the collection of compost or recyclables, or preferred employment, nor does it provide a well-defined role for the communities to work in partnership with facility operations. It is unclear whether the funds required to deliver the MCC's commitment in the MOU were available or allocated. Therefore, it is unclear whether the MOU promises made by the MCC were ever realistic. If it would have been difficult to fund such commitments, the project would have always likely encountered problems once the commitments in Table 2 were not delivered and the social contract between the MCC and community was broken. The framing of NIMBYism places blame on residents, who resist infrastructure that is important and necessary to the larger community. The Msilo site is not an example of "NIMBYism" where people are needlessly standing in the way of development infrastructure simply because they do not want it nearby. After the MCC was unable to fulfil most of its commitments in the MOU, community members allegedly blocked the roads to the Msilo facility to draw attention to their concerns on January 10, 2020 and closed the facility.

Destruction of the solid waste site

On January 10, 2020, it was reported that community members around the Msilo facility caused millions of Kwacha in damage to the perimeter fence and buildings (Figure 2c). A newspaper stated the following 3 months after the site's destruction:

> "'We have been cheated,' says village head Mateyo Mhango from Msilo, near Dunduzu Roadblock. 'Since opening, this has never been a waste management facility as promised. It is a mere dumpsite like the one at Mchengautuwa Township, which attracted a lot of outcry from residents until it was closed.'" (The Nation, April 1, 2020)

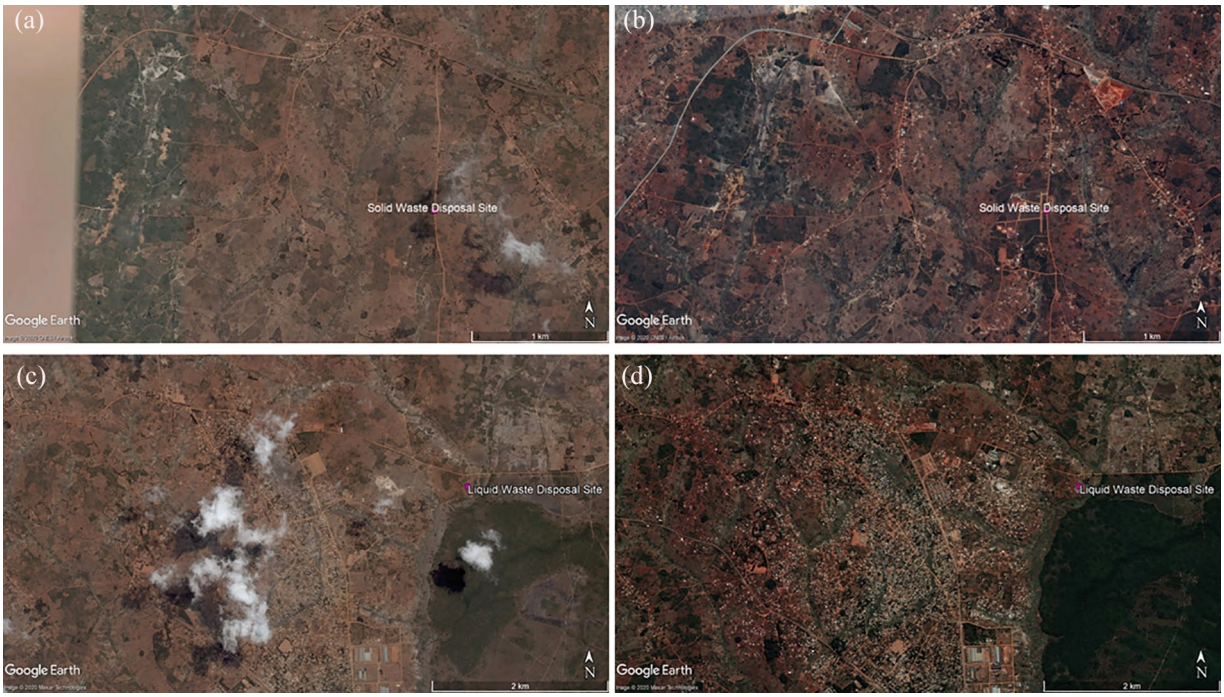


Figure 4. Density of buildings between 2006 and 2018 around the waste sites: (a) Msilo waste management facility site area, 2006, (b) Msilo waste management facility site area, 2018, (c) Nkhorongo liquid waste and fecal sludge pond site area, 2006, and (d) Nkhorongo liquid waste and fecal sludge pond site area, 2018.
Source: Google Earth.

During 2019 and 2020, there were several city-wide protests in Mzuzu related to issues of education, justice, and equality. However, the community concerns regarding the Msilo facility did not attract the attention of the wider city on the day of the alleged site destruction; rather, it was localized to the immediate facility area. Following the destruction of the site, open dumping occurs again in a forested area outside Mzuzu City.

Liquid waste site

The operation of the Nkhorongo facility began before the 1990s and receives both citywide industrial and domestic liquid effluent. The area would also be considered rural, on the city's outskirts. The ponds initially did not have a perimeter fence, but 1 was constructed in 2017 by a non-governmental organization through an award from the European Union (separate from the construction of the Msilo facility). The concrete block fence is approximately 2 m in height, and, according to a researcher's observations (RHH) in January 2020, did not have a lockable or closeable gate allowing open access to the ponds. The fenced area is 0.01 km^2. No organized treatment and reuse is practiced for the waste entering these ponds.[14]

During the truck counting observation, trucks only arrived from 3 companies. The liquid waste site may have caused less frustration to the surrounding community as the arrival and departure times of trucks were within a limited time window, mostly in the morning, and they remained on-site for a short time (Figure a2).

Mallory et al.[14] reported that the households surrounding this site collect untreated sludge whenever there was no guard present, although they could be fined USD 20 if caught. The waste facility is thus a source of fertilizer, and households usually do not use any personal protective equipment for sludge retrieval. Only 1 farmer cited any health risk concerns when consulted about the use of waste from the site, and they referred to the presence of glass and syringes in the sludge, rather than the bacteria and disease risk associated with handling sludge without protection, stating:

> *"I was only doing it because of poverty you see. There was a lack of fertilizer available. So when handling I'd be using bare hands as it was dry. But if I had had {chemical} fertilizer I wouldn't have done it." (Farmer living near the Nkhorongo facility)*

The only community complaint regarding the Nkhorongo site reported by the MCC was from a private school located 1 km away, which reported odor concerns. The surrounding community made no complaints. Communities surrounding the site had access to electricity and piped water for their homes, at a fee, from 2012 or earlier.

Density and use of the surrounding area

The density of buildings in the area around the Msilo and Nkhorongo facilities has increased in the past ten years (Figure 4 and Table 3), indicating the population increase in these areas. They both currently have similar urban densities, indicating that the "NIMBYism" phenomena is not simply

Table 3. Distance to the city center and density of buildings between 2006 and 2018 around the studied waste sites.

SITE	DISTANCE FROM CITY CENTER (KM)	NUMBER OF BUILDINGS WITHIN 1 KM IN 2006	NUMBER OF BUILDINGS WITHIN 1 KM IN 2018
Nkhorongo liquid waste and fecal sludge ponds	10.1	20	221
Msilo waste management facility	10.8	64	195

driven by proximity, but by the type of stakeholder and local context. The presence of the school directly adjacent to Msilo was particularly relevant here. Additionally, the recent conversion of a house into a small commercial rest house near the Msilo facility since the operation of the facility commenced is noteworthy.

Discussion

This research adds to the limited documentation regarding the human dimensions of residents living close to solid waste facilities or dumps in Africa. Increased settlement has been observed, even around landfill sites.[2-5] However, residents living closer to landfill facilities are more likely to reject them.[4,7] Our liquid waste site experienced less opposition by local residents, often termed "NIMBYism," than the new solid waste site. Although there was a similar density of buildings surrounding each studied site and there are no dense slums surrounding either, several decades after operation began the density continued to increase around the liquid waste site. These similarities suggest that the different responses to the liquid and solid waste sites were not due to population and technical factors; rather, "NIMBYism" is defined by planning and communication failures. The criteria used to select the site of the Msilo facility may have been purely technical and ignored social factors. NIMBYism can often be more prevalent amongst communities empowered in society or able to resist infrastructure.[17,18] The Msilo residents were not empowered or represented through the legal processes to change facility operations, but could close the facility through grassroots activism.

This case study is similar to the landfill and community conflict experiences reported by Owusu et al.[2,3] in Accra, Ghana, although both the urban population and waste volumes were smaller in our study. For almost 40 years, the community perceptions of solid waste disposal in Mzuzu have been deteriorating, first with the Mchengautuwa dump site,[15] followed by the purpose-built Msilo facility. During the planning and construction of the Msilo facility, the surrounding community was not involved in decision-making or kept informed; rather, the MCC followed a more legalistic model of acquiring land and conducting an EIA. In the global north, Hunter and Leyden[19] and Johnson and Scicchitano[20] argued that NIMBYism of waste facilities needs to be reframed and understood as a community response to environmental risks, rather than resistance driven by either self-interest or aesthetics. They argued that it is driven by mistrust in the government and fear of health consequences. We observed these same dynamics here in the global south.

Conflict over land use is a common theme; even when land is legally acquired for waste, conflicts can arise when conditions are not agreed upon. There are 2 parallel systems of land ownership and leadership within the rural areas of Mzuzu.[12] Within the city council system, 2 block leaders (1 male and 1 female) are elected in each neighborhood. There is also a traditional African governance structure.[21] In Mzuzu, there is evidence of traditional leaders "grabbing land customarily from rightful owners and selling it to other people".[12] In our study, the perception of the pre-existing Msilo local community was that the land was theirs, despite the legal documentation that may be in place by the MCC. Contestations were also observed in Siiriyiri, Ghana, where the intended land to be used as a landfill was misrepresented to the community as a compost fertilizer factory.[5] Although there was more transparency about the expected land use at Msilo, few conditions agreed in the MOU between the MCC and the community were met well. Gallagher et al.[7] observed that consultation and engagement are both required as part of planning and ongoing operations to gain long-term local acceptance of landfill developments. The MCC's failures to meet agreed conditions may be partially due to the insufficient financial resources for operations. For example, manual solid waste sorting is unrealistic, even for a small city, as it is conducted by 13 staff, which is insufficient even with collecting only 33% of the city's solid waste.

For both the Msilo and Nkhorongo sites, households on the outskirts of the city were hosting citywide public services. One reason for the reduced resistance at the liquid waste site may be the perceived value of the reuse of untreated fecal sludge for agriculture, despite the health risks. However, at the solid waste site, community members had been promised access to safe, cheap, compost, and this had not been delivered. The site fence at Msilo also prevented access to informal scrap dealers, while the fence at other global waste facilities had been specifically damaged for the benefit of scavengers.[5] Therefore, the residents near Msilo only perceived the negative health risks from living close to the site. Furthermore, employment opportunities were limited and unclean, and the salaries from the MCC were often delivered late. Despite the wider investment in local community public services, including electricity, water, and road maintenance and improvement, this compensation package was not perceived to be sufficient by the respondents. The residents were still required to pay for

their water and electricity connections and usage bills, which they may not have initially understood.

One driver of NIMBYism is the increasing density of urban populations, indicating that unattractive infrastructure involved in waste management is either placed further away from town or closer to people's houses. Placing waste disposal sites outside urban centers often results in prohibitively high waste transport costs, thereby disincentivizing safe disposal by waste collectors. Increasing the proximity of households and institutions to waste sites is also not optimal. The satellite data indicate increased densities around Msilo and Nkhorongo. Despite the high level of community resentment toward the Msilo facility before its destruction in 2020, houses and commercial business premises were still constructing nearby.

The analyses of the interviews suggest that the underlying drivers of community resistance and NIMBYism at the solid waste management facility could be linked to insufficient risk communication and community engagement themes. Generally, community opinions regarding the MCC were negative, but there is equal need for strengthening advocacy activities, with community members serving on local government planning task forces. This should be made compulsory for large city projects. In Malawi, the availability of baseline environmental data affecting human health is limited.[22] This poses a unique challenge for risk communication, as data are required for implementing science-based practices. Additionally, friends and family are often sources of risk information. However, individuals can choose to ignore a hazard, even with increased understanding, as indicated by the lack of response to the myriad anti-smoking campaigns in the 1990s.[23] In our case study, there is a contrast between the perception of risks by households around the liquid waste facility, who were accepting and able to access sludge for free,[14] and the Msilo facility, where school management and community leaders were concerned about the observed risks from dogs, flies, and odors and which may not be science-based. Risk perceptions change slowly.[24] A community-driven research partnership between community members bordering the facility and local university researchers could be the most suitable approach to gathering relevant baseline environmental data affecting human health[25] and promoting citizen advocacy activities. This may even be possible with good communication and community engagement. The solid waste process was mismanaged and had a historical precedent in the city; spillover effects into the community may have been inevitable. Therefore, the community's objection was not unreasonable, particularly as the promised benefits were not realized. The problems associated with managing the new site originated from the lack of systems to promote and enforce waste separation at the source, and the lack of capacity to sort waste upon its arrival. Fumes from waste incineration and flies is sadly a common problem cited across waste management sites in Africa.[4,5] Therefore, the community engagement, opposition, and activism processes need to be understood and considered more thoroughly alongside environmental data when planning and siting infrastructure.

Although the number of respondents included in this research was small, the study covered the school teachers, citizens, local government and the construction contractor and thus saturation was achieved. This study did not consider issues of residential property values, environmental injustice or environmental data. Whether the Mchengautuwa or Msilo sites could be moved and the area reclaimed was not investigated.

Conclusion

This study highlights the damaging consequences of planning infrastructure without sufficient community engagement and overall supporting systems. When projects are planned in such a way that fails to consider local stakeholders, and then fails to deliver the promised benefits or mitigate the anticipated risks, there is understandably resistance from community members. In this case study, resistance had led to the need to first relocate the solid waste site from Mchengautuwa and then close the new site at Msilo, a loss of the already scarce financial resources by the city. The relative acceptance of the liquid waste site at Nkhorongo highlights that the response is very contextual and depends on multiple factors that must be studied as part of the planning process. It is difficult for government agencies in the global south to deliver these services and waste management broadly. In this case, an unsuccessful attempt to do something better with a legitimate goal is not necessarily a failure, but part of a natural learning process for getting things right. These cases emphasize the need for donors and government partners to allocate sufficient resources and time to proper planning and community engagement in order to avoid the larger costs of relocating or repeatedly constructing infrastructure.

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Author Contributions

RHH: Conceptualization, Methodology, Investigation, Writing—Original draft preparation, Writing—Reviewing and Editing, Supervision. BAC: Conceptualization, Methodology, Investigation, Writing—Original draft preparation, Writing—Reviewing and Editing. AM: Methodology, Investigation, Writing—Original draft preparation, Writing—Reviewing and Editing. PH: Methodology, Writing—Reviewing and Editing. AP: Methodology, Writing—Original draft preparation, Writing—Reviewing and Editing, Funding acquisition.

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REFERENCES

1. van Niekerk S, Weghmann V. Municipal solid waste management services in Africa. Working Paper. *Public Services International*. 2019.
2. Owusu G, Oteng-Ababio M, Afutu-Kotey RL. Conflicts and governance of landfills in a developing country city, Accra. *Landsc Urban Plann*. 2012;104:105-113.
3. Owusu G, Nketiah-Amponsah E, Codjoe SNA, Afutu-Kotey RL. How do Ghana's landfills affect residential property values? A case study of two sites in Accra. *Urban Geogr*. 2014;35:1140-1155.
4. Njoku PO, Edokpayi JN, Odiyo JO. Health and environmental risks of residents living close to a landfill: a case study of thohoyandou landfill, Limpopo Province, South Africa. *Int J Environ Res Public Health*. 2019;16:2125.
5. Kansanga MM, Ahmed A, Kuusaana ED, Oteng-Ababio M, Luginaah I. Of waste facility siting and relational geographies of place: peri-urban landfills, community resistance and the politics of land control in Ghana. *Land Use Policy*. 2020;96:104674.
6. Devine-Wright P. Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy*. 2005;8:125-139.
7. Gallagher L, Ferreira S, Convery F. Host community attitudes towards solid waste landfill infrastructure: comprehension before compensation. *J Environ Plann Manag*. 2008;51:233-257.
8. Simsek C, Elci A, Gunduz O, Taskin N. An improved landfill site screening procedure under NIMBY syndrome constraints. *Landsc Urban Plann*. 2014;132:1-15.
9. Sebastien L. From NIMBY to enlightened resistance: a framework proposal to decrypt land-use disputes based on a landfill opposition case in France. *Local Environ*. 2017;22:461-477.
10. Malawi Government. 2018 Malawi Population and Housing Census Report. National Statistical Office; 2019.
11. Malawi Government. National Sanitation Policy. *Ministry of Irrigation and Water Development, Lilongwe;* 2008.
12. Mzuzu City Council (MCC). *Urban Profile* 2013-2017. Mzuzu; 2013.
13. Holm RH, Kamangira A, Tembo M, et al. Sanitation service delivery in smaller urban areas (Mzuzu and Karonga, Malawi). *Environ Urban*. 2018a;30:597-612.
14. Mallory A, Crapper M, Holm RH. Agent-based modelling for simulation-based design of sustainable faecal sludge management systems. *Int J Environ Res Public Health*. 2019;16:1125.
15. Chinyama MPM, Madhlopa A. An assessment of municipal solid waste management in the city of Mzuzu, Malawi. *Malawi J Sci Technol*. 1999;5:40-49.
16. Malawi Government. Environment management act. No. 23 of 1996. 1996.
17. Patel Z. Environmental justice in South Africa: tools and trade-offs. *Soc Dyn*. 2009;35:94-110.
18. Pieterse E. Post-apartheid geographies in South Africa: why are urban divides so persistent. Interdisciplinary debates on development and cultures: cities in development—spaces, conflicts and agency. Leuven University; 2009. December 15, 2009.
19. Hunter S, Leyden KM. Beyond NIMBY: explaining opposition to hazardous waste facilities. *Policy Stud J*. 1995;23:601-619.
20. Johnson RJ, Scicchitano MJ. Don't call me NIMBY: public attitudes toward solid waste facilities. *Environ Behav*. 2012;44:410-426.
21. Msukwa CAPS, Keim-Lees M. Endogenous African Governance Systems: what roles do women play in rural Malawi? *Dev Pract*. 2014;24:735-742.
22. Holm RH, Kunkel G, Nyirenda L. A thought leadership piece: where are the rural groundwater quality data for the assessment of health risks in northern Malawi? *Groundw Sustain Dev*. 2018b;7:157-163.
23. Bennett P, Calman K (Eds). *Risk Communication and Public Health*. Oxford University Press; 1999.
24. Slovic P. *The Perception of Risk*. Earthscan Publications Ltd; 2000.
25. Heaney CD, Wing S, Wilson SM, et al. Public infrastructure disparities and the microbiological and chemical safety of drinking and surface water supplies in a community bordering a landfill. *J Environ Health*. 2013;75:24-36.

Appendix

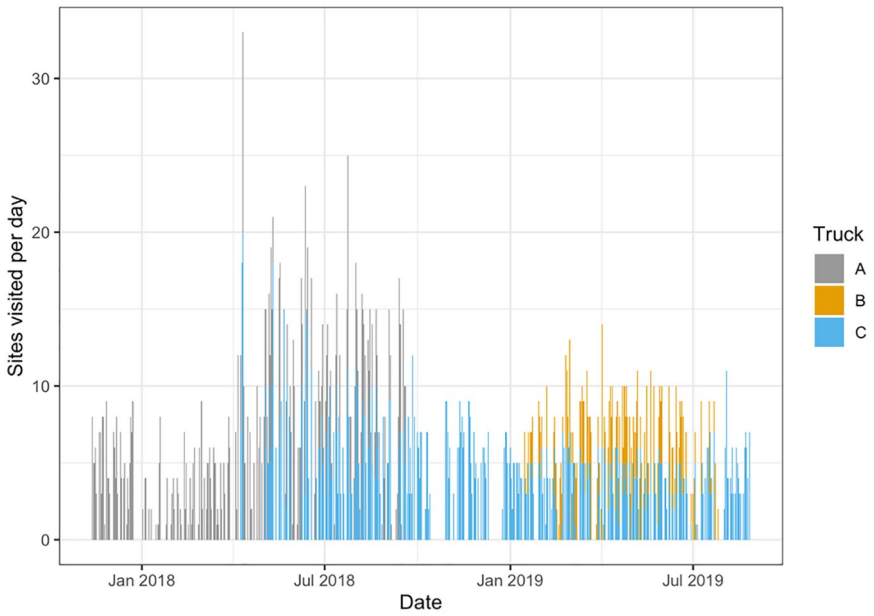


Figure a1. Mzuzu City Council solid waste truck daily pickup visit frequency from November 2017 to August 2019 (data from vehicle mileage logbooks).

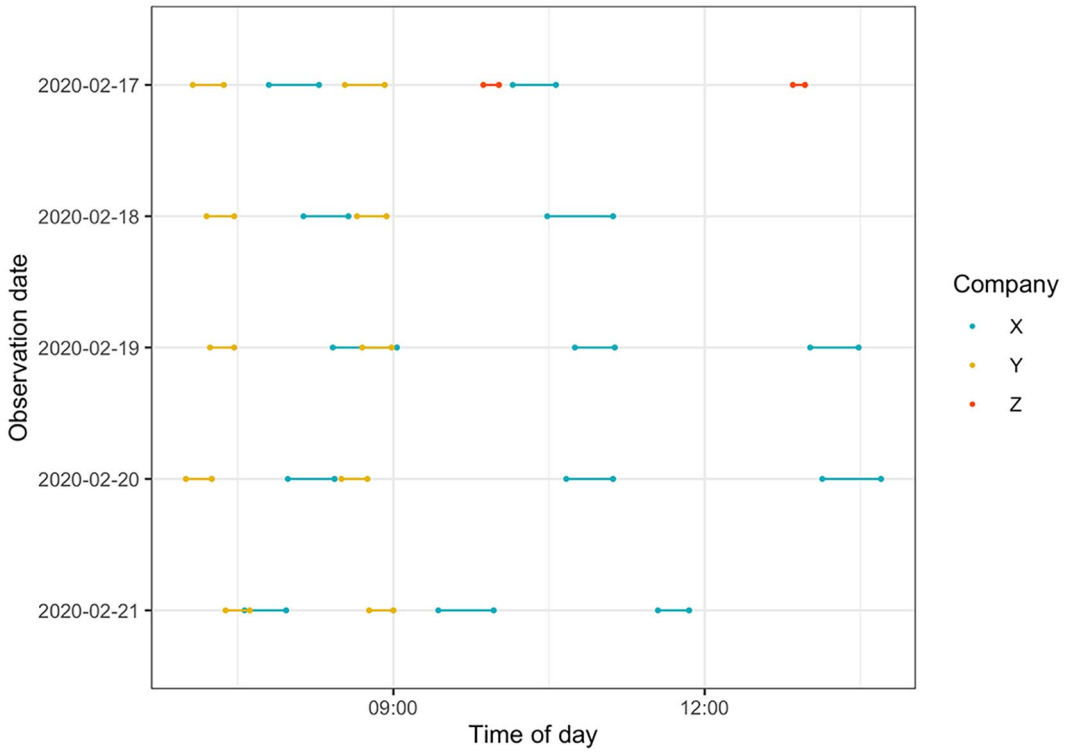


Figure a2. Liquid waste disposal frequency at the Nkhorongo facility by company (researcher observations in February 2020).



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